

CLAIMS

1. A management terminal apparatus comprising:
an information acquiring section acquiring
5 communication profile information containing
information for a wireless communication scheme, used
frequency bandwidth, communication start time and
communication duration time used by a communication party
with another wireless terminal apparatus;
10 a generating section comparing the communication
profile information and past communication permission
history, and generating communication permit/deny
information indicating communication permission or
denial in accordance with the communication profile
15 information; and
a transmission section transmitting generated
communication permit/deny information to the wireless
terminal apparatus.
- 20 2. The management terminal apparatus according to claim
1, wherein the communication profile information acquired
by the information acquiring section, in addition to the
information, further contains at least one of a modulation
scheme, encoding rate, transmission power and spreading
25 factor used by the communication party with the other
wireless terminal apparatus.

3. The management terminal apparatus according to claim 1, wherein:

the information acquiring section, in addition to the communication profile information, acquires desired
5 throughput information for between the communication party and the other wireless terminal apparatus; and

the generating section calculates expected throughput at each communication link using the communication profile information and past communication
10 permission history, and generates communication permit/deny information indicating communication permission or denial in accordance with the communication profile information by comparing the expected throughput value and the desired throughput information.

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4. The management terminal apparatus according to claim 3, wherein:

the information acquiring section, in addition to the communication profile information and the desired
20 throughput information, acquires actual throughput from the wireless terminal apparatus; and

the generating section, in addition to the communication profile information and the desired throughput information, calculates expected throughput
25 values using the actual throughput, and generates communication permit/deny information indicating communication permission or denial according to the

communication profile information by comparing the expected throughput values and the desired throughput information.

5 5. The management terminal apparatus of claim 1, wherein:

the information acquiring section receives the communication profile information using a wireless communication scheme different to the wireless
10 communication scheme used by the communication party with the other wireless terminal apparatus; and

the transmission section transmits the communication permit/deny information using the same wireless communication scheme as the wireless
15 communication scheme of the receiving section.

6. The management terminal apparatus of claim 1, wherein the generating section generates communication permit information containing changed communication
20 profile information where the information is changed in the case that communication permission is possible if at least one item of information contained in the communication profile information is changed.

25 7. The management terminal apparatus of claim 3, wherein:

the generating section: generates

communication permit information containing changed communication profile information where the information is changed in the case that it is possible for the expected throughput values occurring at each communication link to satisfy the desired throughput if at least one item of information contained in the communication profile information is changed.

8. The wireless terminal apparatus of claim 3, wherein the generating section changes at least one item of information contained in the communication profile information in such a manner that the total of the expected throughput values for each link is a maximum, and generates communication permit information containing the updated communication profile information where the information is changed.

9. The management terminal apparatus according to claim 1, further comprising a storage section storing communication profile information corresponding to communication permit information as communication permission history.

10. The management terminal apparatus according to claim 9, further comprising, in addition to communication permission history, a storage section storing required throughput information corresponding to communication

permit information.

11. A wireless terminal apparatus comprising:

- 5 a generating section generating communication profile information containing information for a wireless communication scheme, used frequency bandwidth, communication start time, and/or a communication continuation time corresponding to a communication request in the event that the communication request occurs
- 10 with another wireless terminal apparatus; and
- a transmission section transmitting generated communication profile information to the management terminal apparatus.

15 12. The wireless terminal apparatus according to claim 11, wherein the generating section, in addition to the information, further generates communication profile information containing at least one of a modulation scheme, encoding rate, transmission power and spreading factor

20 corresponding to the communication request.

13. The wireless terminal apparatus according to claim 11, wherein the generating section, in addition to the communication profile information, generates desired

25 throughput information corresponding to the communication request; and

the transmission section transmits the generated

communication profile information and the desired throughput information to the management terminal apparatus.

5 14. The terminal apparatus according to claim 11, wherein the transmission section transmits the communication profile information using a wireless communication scheme different to the wireless communication scheme corresponding to the communication
10 request.

15 15. The wireless terminal apparatus of claim 11, further comprising a receiving section receiving communication permit/deny information indicating communication permission or denial corresponding to the communication profile information from the management terminal apparatus, wherein:

the transmission section starts communication with the other wireless terminal apparatus in the event that
20 the communication permit information is received.

16. The wireless terminal apparatus according to claim 15, wherein:

the generating section: generates new communication
25 profile information in the event that communication deny information is received; and

the transmission section transmits generated new

communication profile information to the management terminal apparatus in the event that communication deny information is received.

5 17. The wireless terminal apparatus of claim 15, wherein:

the receiving section receives communication permit information containing changed communication profile information where at least one item of information
10 contained in the communication profile information is changed; and

the transmission section starts communication with the other wireless terminal apparatus in accordance with the changed communication profile information.

15

18. The wireless terminal apparatus according to claim 11, further comprising a receiving section receiving communication permit/deny information indicating communication permission or denial corresponding to the
20 communication profile information from the management terminal apparatus, wherein:

the transmission section transmits notification of completion of the communication to the management terminal apparatus after communication is complete based
25 on communication permit information from the management terminal apparatus.

19. The wireless terminal apparatus according to claim 11, further comprising a receiving section receiving communication permit/deny information indicating communication permission or denial corresponding to the communication profile information from the management terminal apparatus, wherein:

the transmission section transmits actual throughput in communications based on communication permit information from the management terminal apparatus to the management terminal apparatus.

20. A wireless communication system having a plurality of wireless terminal apparatus and management terminal apparatus,

the wireless terminal apparatus comprising:

a generating section generating communication profile information containing information for a wireless communication scheme, used frequency bandwidth, communication start time, and/or a communication continuation time corresponding to a communication request in the event that the communication request occurs with another wireless terminal apparatus; and

a transmission section transmitting generated communication profile information to the management terminal apparatus, and

the management terminal apparatus comprising:

a receiving section receiving the communication

profile information from the wireless terminal apparatus;

a generating section comparing the received communication profile information and past communication permission history, and generating communication
5 permit/deny information indicating communication permission or denial in accordance with the communication profile information; and

a transmission section transmitting generated communication permit/deny information to the wireless
10 terminal apparatus.

21. The wireless communication system according to claim 20, further comprising relay terminal apparatus transmitting, receiving, and relaying the communication
15 profile information and the communication permit/deny information between the wireless terminal apparatus and the management terminal apparatus.

22. A wireless communication system having a plurality
20 of wireless terminal apparatus and management terminal apparatus,

the wireless terminal apparatus comprising:

a generating section generating a trigger signal notifying of a communication request in the event that
25 a communication request occurs with another wireless terminal apparatus; and

a transmission section transmitting the generated

trigger signal to the management terminal apparatus, and

the management terminal apparatus comprising:

a receiving section receiving the trigger signal
from the wireless terminal apparatus;

5 an acquiring section receiving the trigger signal
and acquiring communication profile information relating
to the wireless communication scheme corresponding to
the communication request;

a generating section comparing the acquired
10 communication profile information and past communication
permission history, and generating communication
permit/deny information indicating communication
permission or denial in accordance with the communication
profile information; and

15 a transmission section transmitting generated
communication permit/deny information to the wireless
terminal apparatus.

23. A wireless communication method for a wireless
20 communication system having a plurality of wireless
terminal apparatus and management terminal apparatus,
comprising the steps of:

the wireless terminal apparatus generating
communication profile information containing
25 information for a wireless communication scheme, used
frequency bandwidth, communication start time, and/or
a communication continuation time corresponding to a

communication request in the event that the communication request occurs with another wireless terminal apparatus;

the wireless terminal apparatus transmitting the generated communication profile information;

5 the management terminal apparatus acquiring communication profile information containing information for a wireless communication scheme, used frequency bandwidth, communication start time, and communication continuation time corresponding to a
10 communication request corresponding to the communication request;

the management terminal apparatus comparing the acquired communication profile information and past communication permission history, and generating
15 communication permit/deny information indicating communication permission or denial in accordance with the communication profile information; and

the management terminal apparatus transmitting generated communication permit/deny information to the
20 wireless terminal apparatus.

24. An arithmetic apparatus calculating degree of interference indicating magnitude of interference
25 incurred by a first communication link from a second communication link applied with a wireless communication scheme different to that of the first communication link,

comprising:

a setting section setting an interference parameter coefficient indicating a relative ratio of change in influence of interference in the case that each communication parameter occurring in a wireless communication scheme applied to the first communication link changes, a unit time for calculating degree of interference, a first link bandwidth indicating a frequency band utilized by the first communication link at each timing within the unit time, an overlapping frequency bandwidth indicating a bandwidth of a frequency band of overlapping of the frequency band utilized at the first communication link and the frequency band utilized at the second communication link for each timing, a first power value for the first communication link occurring at each timing, and a second power value for the second communication link occurring at the overlapping frequency band; and

a calculating section calculating the degree of interference from the set values using the following equation:

[Equation 1]

Degree of interference =

$$\frac{\text{Interference parameter coefficient}}{\text{Unit time}} \times \int_{\text{Unit time}} \frac{\text{Overlapping bandwidth}}{\text{First link bandwidth}} \times \frac{\text{Second power value}}{\text{First power value} + \text{Second power value}}$$

25. An arithmetic apparatus comprising:

a setting section setting degree of interference indicating magnitude of interference incurred by a first communication link from a second communication link applied with a wireless communication scheme different to that of the first communication link, reference throughput relating to a wireless communication scheme applied to the first communication link, and a throughput parameter coefficient indicating a ratio with respect to the reference throughput of the throughput in the case of changing the parameter corresponding to the reference throughput to another parameter; and

a calculating section calculating an expected throughput for the first communication link from the set values using the following equation.

[Equation 2]

Expected throughput value =

Reference throughput \times Throughput parameter coefficient \times (1 - Degree of interference)

FIG. 1

MANAGEMENT TERMINAL APPARATUS 10
WIRELESS TERMINAL APPARATUS 20-1
WIRELESS TERMINAL APPARATUS 20-2
5 WIRELESS TERMINAL APPARATUS 20-3
WIRELESS TERMINAL APPARATUS 20-4

FIG. 2

MANAGEMENT TERMINAL APPARATUS 200
10 WIRELESS TERMINAL APPARATUS 100-1
WIRELESS TERMINAL APPARATUS 100-2
WIRELESS TERMINAL APPARATUS 100-3
WIRELESS TERMINAL APPARATUS 100-4

15 FIG. 3

CONTROL SECTION 110
COMMUNICATION PROFILE GENERATING SECTION 120
STORAGE SECTION 130
WIRELESS SECTION 140

20

FIG. 4 (SELECTED VIEW)

COMMUNICATION PERMISSION GENERATING SECTION 220
WIRELESS SECTION 210
STORAGE SECTION 230

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FIG. 5A

MANAGEMENT TERMINAL APPARATUS 200

WIRELESS TERMINAL APPARATUS 100-1
WIRELESS TERMINAL APPARATUS 100-2
WIRELESS SECTION 210
COMMUNICATION PERMISSION GENERATING SECTION 220
5 STORAGE SECTION 230
WIRELESS SECTION 140
CONTROL SECTION 110
COMMUNICATION PROFILE GENERATING SECTION 120
STORAGE SECTION 130
10 WIRELESS SECTION 140
401 COMMUNICATION REQUEST
404 COMMUNICATION PROFILE INFORMATION GENERATION
406 COMMUNICATION PROFILE INFORMATION HOLDING
408 CONFIGURATION SWITCHING
15 409 TRANSMISSION PROCESSING
411 RECEPTION PROCESSING

FIG. 5B

MANAGEMENT TERMINAL APPARATUS 200
20 WIRELESS TERMINAL APPARATUS 100-1
WIRELESS TERMINAL APPARATUS 100-2
WIRELESS SECTION 210
COMMUNICATION PERMISSION GENERATING SECTION 220
STORAGE SECTION 230
25 WIRELESS SECTION 140
CONTROL SECTION 110
COMMUNICATION PROFILE GENERATING SECTION 120

STORAGE SECTION 130

WIRELESS SECTION 140

411 RECEPTION PROCESSING

414 COMMUNICATION PERMISSION GENERATION

5 417 TRANSMISSION PROCESSING

418 COMMUNICATION PERMISSION HISTORY HOLDING

420 RECEPTION PROCESSING

424 CONFIGURATION SWITCHING

10 FIG. 6

START

S1000 REFER TO COMMUNICATION PROFILE
INFORMATION

S1100 FREQUENCY OVERLAPPED?

15 S1200 COMMUNICATION TIME OVERLAPPED?

S1300 COMMUNICATION POSSIBLE AT DIFFERENT
FREQUENCY?

S1400 COMMUNICATION START TIME CAN BE CHANGED?

S1500 MODULATION SCHEME·ENCODING RATE CAN BE

20 CHANGED?

S1600 CHANGE MODULATION SCHEME·ENCODING RATE

S1700 CALCULATE COMMUNICATION CONTINUATION
TIME·TRANSMISSION POWER

S1800 PERMIT COMMUNICATION

25 S1900 DENY COMMUNICATION

END

FIG. 8

COMMUNICATION LINK 300-2

COMMUNICATION CONTINUATION TIME

5 COMMUNICATION LINK 300-1

COMMUNICATION CONTINUATION TIME

FIG. 10

MANAGEMENT TERMINAL APPARATUS 200

10 RELAY TERMINAL APPARATUS 600-1

RELAY TERMINAL APPARATUS 600-2

WIRELESS TERMINAL APPARATUS 100-1

WIRELESS TERMINAL APPARATUS 100-1

WIRELESS TERMINAL APPARATUS 100-3

15 WIRELESS TERMINAL APPARATUS 100-3

WIRELESS TERMINAL APPARATUS 100-2

WIRELESS TERMINAL APPARATUS 100-2

WIRELESS TERMINAL APPARATUS 100-4

WIRELESS TERMINAL APPARATUS 100-4

20

FIG. 11

CONTROL SECTION 620

STORAGE SECTION 630

WIRELESS SECTION 610

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FIG. 12A

MANAGEMENT TERMINAL APPARATUS 200

- RELAY TERMINAL APPARATUS 600-1
- WIRELESS TERMINAL APPARATUS 100-1
- WIRELESS SECTION 610
- CONTROL SECTION 620
- 5 STORAGE SECTION 630
 - 401 COMMUNICATION REQUEST
 - 404 COMMUNICATION PROFILE INFORMATION GENERATION
 - 408 CONFIGURATION SWITCHING
 - 409 TRANSMISSION PROCESSING
- 10 802 RECEPTION PROCESSING
 - 806 CONFIGURATION SWITCHING
 - 807 TRANSMISSION PROCESSING
 - 411 RECEPTION PROCESSING
- 15 FIG. 12B
 - MANAGEMENT TERMINAL APPARATUS 200
 - RELAY TERMINAL APPARATUS 600-1
 - WIRELESS TERMINAL APPARATUS 100-1
 - WIRELESS SECTION 610
- 20 CONTROL SECTION 620
 - STORAGE SECTION 630
 - 411 RECEPTION PROCESSING
 - 414 COMMUNICATION PERMISSION GENERATION
 - 417 TRANSMISSION PROCESSING
- 25 810 RECEPTION PROCESSING
 - 814 CONFIGURATION SWITCHING
 - 815 TRANSMISSION PROCESSING

420 RECEPTION PROCESSING

424 CONFIGURATION SWITCHING

FIG. 13

5 MANAGEMENT TERMINAL APPARATUS 1200

WIRELESS TERMINAL APPARATUS 100-1

WIRELESS TERMINAL APPARATUS 100-3

WIRELESS TERMINAL APPARATUS 100-2

WIRELESS TERMINAL APPARATUS 100-4

10

FIG. 14

COMMUNICATION PERMISSION GENERATING SECTION 1220

WIRELESS SECTION 210

STORAGE SECTION 230

15

FIG. 15

GENERATING SECTION 1223

EXPECTED THROUGHPUT VALUE CALCULATING SECTION 1222

DETERMINING SECTION 1221

20 WIRELESS SECTION 210

STORAGE SECTION 230

FIG. 16A

MANAGEMENT TERMINAL APPARATUS 1200

25 WIRELESS TERMINAL APPARATUS 100-1

WIRELESS TERMINAL APPARATUS 100-2

WIRELESS SECTION 210

- COMMUNICATION PERMISSION GENERATING SECTION 1220
- STORAGE SECTION 230
- WIRELESS SECTION 140
- CONTROL SECTION 110
- 5 COMMUNICATION PROFILE GENERATING SECTION 120
 - STORAGE SECTION 130
 - WIRELESS SECTION 140
 - 401 COMMUNICATION REQUEST
 - 404 COMMUNICATION PROFILE INFORMATION GENERATION
 - 10 406 COMMUNICATION PROFILE INFORMATION HOLDING
 - 408 CONFIGURATION SWITCHING
 - 409 TRANSMISSION PROCESSING
 - 411 RECEPTION PROCESSING
- 15 FIG. 16B
 - MANAGEMENT TERMINAL APPARATUS 1200
 - WIRELESS TERMINAL APPARATUS 100-1
 - WIRELESS TERMINAL APPARATUS 100-2
 - WIRELESS SECTION 210
- 20 COMMUNICATION PERMISSION GENERATING SECTION 1220
 - STORAGE SECTION 230
 - WIRELESS SECTION 140
 - CONTROL SECTION 110
 - COMMUNICATION PROFILE GENERATING SECTION 120
- 25 STORAGE SECTION 130
 - WIRELESS SECTION 140
 - 411 RECEPTION PROCESSING

1501 COMMUNICATION PERMISSION GENERATION
417 TRANSMISSION PROCESSING
418 COMMUNICATION PERMISSION HISTORY HOLDING
420 RECEPTION PROCESSING
5 424 CONFIGURATION SWITCHING

FIG.17

START

S1000 REFER TO COMMUNICATION PROFILE
10 INFORMATION
S1100 FREQUENCY OVERLAPPED?
S1200 COMMUNICATION POSSIBLE AT DIFFERENT
FREQUENCY?
S1300 COMMUNICATION TIME OVERLAPPED?
15 S1400 COMMUNICATION START TIME CAN BE CHANGED?
S2000 CALCULATE EXPECTED THROUGHPUT VALUE FOR
EACH COMMUNICATION
S2100 SATISFY DESIRED THROUGHPUT FOR EACH
COMMUNICATION?
20 S2200 ATTEMPT ALL COMBINATIONS OF PARAMATERS
CAPABLE OF CHANGING?
S1800 PERMIT COMMUNICATION
S1900 DENY COMMUNICATION
S2300 CHANGE PARAMETER OF COMMUNICATION
25 PROFILE INFORMATION
END

Equations

Expected throughput value

Reference throughput

5 Throughput parameter coefficient

Degree of interference

Interference parameter coefficient

Unit time

Overlapping bandwidth

10 Own bandwidth

Other overlapping communication link power

Own power

Second

Transmission power

15 First link bandwidth

Second power value

First power value

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